इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 3947 (1994): Shipbuilding - Testing, installation and maintenance of marine portable fire appliances - Code of practice [TED 19: Marine Engineering and Safety Aids]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

IS 3947 : 1994
(Reaffirmed 2004)

भारतीय मानक

पोतनिर्माण – समुद्री परीक्षण संस्थापन और रख-रखाव के लिए सुवाहा अग्नि साधित्र – रीति संहिता

(पहला पुनरीक्षण)

Indian Standard

SHIPBUILDING — TESTING, INSTALLATION AND MAINTENANCE OF MARINE PORTABLE FIRE APPLIANCES – CODE OF PRACTICE

(First Revision)

UCD 614·843 : 629·12·047

BIS 1994

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

July 1994 **Price Group 7**

Marine Instruments and Safety Aids Sectional Committee, TED 20

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Marine Instruments and Safety Aids Sectional Committee had been approved by the Transport Engineering Division Council.

Appliances detailed in this standard are relating to portable equipment only. Fixed fire appliances are not covered. Portable extinguishers, called first-aid fire fighting equipment, are small hand appliances for dealing with fires in their incipient stage. The right type of appliance in good working order and personnel sufficiently trained to operate it properly, are essential.

Notwithstanding what is stated in this standard, portable fire appliances provided on board merchant navy ships, shall conform to statutory rules in this regard under the latest Merchant Shipping (Fire Appliances) Rules as modified from time to time and shall be subject to the approval of the Government of India.

This standard was first published in 1966. This revision has taken into account the latest technological developments and introduction of new materials for fire fighting purposes. The salient features in this revision are:

a) Carbon tetrachloride extinguishers have been replaced by Halons 1211 extinguishers because of their extreme toxicity;

b) Further classification of fires have been done. The revised classification includes Class C and Class D of fires. Classes A, B and E fires are as per the earlier version. The new classes of fire are:

  — Class C fires for inflammable gases under pressure including liquefied gases:

  — Class D fires involving combustible metals; and

c) The selection of appliances has been based on the new classification of fires.

In the preparation of this standard assistance has been drawn from the provisions of International Convention on Safety of Life at Sea (SOLAS), 1974 with SOLAS amendments up to 1981 and IMO Resolution A. 518 (13).

The Committee responsible for the preparation of this standard is given in **Annex F**.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SHIPBUILDING — TESTING, INSTALLATION AND MAINTENANCE OF MARINE PORTABLE FIRE APPLIANCES — CODE OF PRACTICE

(First Revision)

1 SCOPE

This Indian Standard lays down the requirements in respect of installation, maintenance and testing of portable fire fighting appliances used onboard ships.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
5 : 1978	Colours for ready mixed paints and enamels (*third revision*)
926 : 1985	Specification for fireman's axe (*second revision*)
933 : 1989	Specification for portable chemical foam fire extinguisher (*fourth revision*)
934 : 1989	Specification for portable fire extinguisher, water type (soda acid) (*fourth revision*)
940 : 1989	Specification for portable fire extinguisher, water type (gas cartridge) (*third revision*)
2171 : 1985	Specification for portable fire extinguishers, dry powder (cartridge type) (*third revision*)
2190 : 1992	Selection, installation and maintenance of first-aid fire extinguishers — Code of practice (*second revision*)
2546 : 1974	Specification for galvanized mild steel fire bucket (*first revision*)
2878 : 1986	Specification for fire extinguishers, carbon dioxide type (portable and trolley mounted) (*second revision*)
4308 : 1982	Specification for dry powder for fire fighting (*first revision*)
4947 : 1985	Specification for gas cartridges for use in fire extinguishers (*second revision*)
5099 : 1983	Technical supply conditions for twist drills (*first revision*)
5441 : 1986	Portable pneumatic drilling machines (*first revision*)
5490 (Part 1) : 1977	Specification for refills for portable fire extinguishers and chemical fire engines : Part 1 For soda acid portable fire extinguishers (*first revision*)
7285 : 1988	Seamless managnese steel cylinders for permanent and high pressure liquefiable gases (*second revision*)
10204 : 1982	Specification for portable fire extinguishers mechanical foam type
10245 (Part 3) : 1982	Specification for breathing apparatus : Part 2 Open circuit breathing apparatus
10245 (Part 4) : 1982	Specification for breathing apparatus : Part 4 Escape breathing apparatus (short duration self-contained type)
11108 : 1984	Specification for portable fire extinguisher halons — 1211 type

3 TERMINOLOGY

For the purpose of this standard definitions relating to the various types of first-aid fire extinguishers shall be as given in IS 2190 : 1992 (*see* also Annex A).

4 APPLIANCES

4.1 Fire Buckets

The buckets shall be painted with Indian Standard colour No. 356, 'fire red' of IS 5 : 1978 and shall be permanently marked with the word 'Fire' and filled with water or sand.

4.1.1 Fire buckets meant to be used with water, shall be fitted with lanyards of sufficient length to enable the buckets to be filled from the sea.

4.1.2 The fire buckets shall be of about 9 litres capacity, light and easy to handle and shall conform to IS 2546 : 1974.

4.1.3 Fire buckets shall not be used for any purpose other than extinguishing fire.

4.2 Fire Extinguishers

The fire extinguishers shall be of approved type. The capacity of portable fluid fire extinguishers shall not be more than 13·5 litres and not less than 9 litres. Other extinguishers shall not be in excess of equivalent portability of 13·5 litres fluid extinguishers. The equivalent of fire extinguishers are given for guidance in **Annex B**.

4.2.1 Fire extinguishers containing an extinguishing medium, which either by itself or when in use, gives off gases harmful to persons, shall not be used. For radio rooms and switchboards, extinguishers containing not more than 1·25 kg + 50 g of Halon 1211 gas or similar media may be permitted, subject to such extinguishers being additional to the number required for that particular ship.

4.3 Fireman's Axe

The fireman's axe conforming to IS 926 : 1985 shall have a short handle of wood or other well insulated materials. The head shall have a spike and a cutting edge. The fireman's axe shall be provided with a carrying belt. In addition, a long handle axe of the felling type shall also be provided.

4.4 Safety Lamps

Safety lamps are classified as Classes I and II; Class I safety lamps shall be used with all ships inclusive of tankers and Class II safety lamps with any ship other than those carrying petroleum cargo.

4.4.1 Class I safety lamps shall have their casings and external fittings made of a material other than steel. When steel is used, they shall be clad with a non-spark-producing material.

4.4.2 Safety lamps shall be operated by electric battery. The lamps shall be capable of burning for a minimum period of three hours. Means for easy attachment to the user shall be provided. These shall be of hand or head lamp type. All safety lamps shall be fitted with means for easy attachment of the lamp to the user at about waist level.

4.4.3 Safety lamps of approved type shall only be provided. The batteries for the safety lamps, if chargeable type, shall have charging facilities onboard ships.

4.5 Breathing Apparatus, Smoke Mask and Smoke Helmet

These shall be of approved type, self-contained breathing apparatus conforming to IS 10245 (Part 4) : 1982 or a smoke mask or an air smoke helmet. Smoke masks and smoke helmets are to be those for which supply of air is obtained from open deck; should the length of the air pumps or air hose sufficient to reach any point of the holds or machinery spaces from the open deck exceed 36 metres in length, a self-contained breathing apparatus shall be substituted or provided, as an additional appliance.

4.6 In addition to the minimum number of air hose type of breathing apparatus, it is recommended that a self-contained compressed air breathing apparatus conforming to IS 10245 (Part 3) : 1982 may be provided. It shall be capable of functioning for a period of 45 minutes. However, oxygen type of breathing apparatus shall not be used on board merchant ships.

4.7 Air hoses for smoke masks or smoke helmets shall be of non-collapsing type. Minimum length of hose for each set shall be 18 m. Where the length of hose exceeds 27 m, bellows shall be provided.

4.8 The outfit complete with air hose, fire-proof life line, safety belt and bellows comprising the equipment, shall be stowed in a box in readily accessible and widely separated positions with detailed instructions prominently displayed on the lid.

4.9 Portable Electric Drilling Machine

A portable drilling machine conforming to IS 5441 : 1986 shall be provided with various sizes of drills, at least up to 13 mm diameter. The drills shall conform to IS 5099 : 1983. The drilling machine and the drills shall be stowed outside the machinery space in an accessible position.

5 GENERAL

5.1 None of the extinguishers covered in this standard is expected to deal with a large fire as all of these are essentially first-aid fire fighting appliances. Nevertheless, these are very valuable if used promptly and efficiently in the early stages of a fire. In addition to the value of their portability, the most important feature of these extinguishers is their immediate availability so that each extinguisher may be used by one person. The usefulness of these extinguishers is limited as it is entirely dependent upon the presence of persons having knowledge to operate them. Furthermore their capacity is also limited and their operational value largely depends upon the initial charge being sufficient to overcome and confine the fire. The capacity of such extinguishers shall be commensurate with the risk these are intended to cover. The appliance shall be selected to cover the particular hazard involved as shown in **Annex C**.

5.2 Portable fire appliances shall be kept in good order and available for immediate use at all times. The operators shall have good knowledge of using them.

5.3 Use of variety of fire extinguishers, with different methods of operation, often leads to confusion and consequent failure to operate them properly. Hence, it is essential that the portable fire extinguishers fitted in passenger and crew spaces of ship shall be of the appropriate type suitable for that particular space, but with not more than two different modes of operation.

5.4 Clearly defined instructions and layout plans of fire fighting equipment, means of escape, etc, shall be displayed at prominent places on the ship.

5.5 Practice fire drills shall be held at frequent intervals as deemed necessary to acquaint the ship's staff of the correct use of fire fighting appliances and to increase alertness and efficiency in tackling fires on board. In any case, the interval shall not exceed 14 days.

5.6 In no case, a fire extinguisher shall be placed in a position where it is likely to gain heat from the surrounding equipment or the process.

6 NUMBER OF APPLIANCES

The number, type and position of portable fire appliances shall be determined by the appropriate authority, according to class of ship, the type and size of propelling machinery and the gross tonnage of the ship.

7 STOWAGE OF PORTABLE FIRE APPLIANCES

7.1 Extinguishers in which the medium is stored under pressure, shall not be stowed in passenger and crew spaces.

7.2 All portable fire appliances, other than fireman's outfits provided onboard ships, shall be stowed where they shall be readily accessible at the spaces in which they are intended to be used. Fire extinguishers shall be stowed near the entrances to the spaces in which they are intended to be used. Recommended stowage spaces are shown in **Annex D**.

8 GENERAL MAINTENANCE

8.1 General maintenance of all fire appliances shall be as given in **Annex E.**

8.2 A proportion of the fire extinguishers shall be discharged at periodical inspections. At least one spare charge of the appropriate type shall be provided for each portable fire extinguisher.

8.3 Portable fire extinguishers of the carbon dioxide type shall be subjected to hydraulic stretch test as given in IS 7285 : 1988. The date of test shall be marked on the extinguishers.

8.4 Carbon dioxide gas cartridges for use with portable fire extinguishers shall be renewed or recharged, if the weight of the gas is found to be less than 10 percent of the rated value. Once in four years, the cylinders shall be emptied and subjected to hydraulic test prior to recharging.

8.4.1 All steel cartridges containing carbon dioxide gas for use with portable fire extinguishers shall conform to IS 4947 : 1985. While recharging, CO_2 gas cartridges conforming to IS 4947 : 1985 shall only be used for replacement. All steel cartridges shall be marked with tare and gross weights in an indelible manner.

8.5 Breathing apparatus, smoke helmets or smoke masks shall be periodically inspected to ensure that they are in good condition. Where air hoses are in two or more parts for coupling together, it shall be seen, that proper male and female couplings are fitted to provide for one continuous length of hose.

8.6 Portable fire extinguishers of the fluid type (water, CO_2, Soda-acid, chemical foam) but not CO_2 gas extinguisher shall be hydraulically tested to a pressure of 21 kgf/cm^2 for a continuous period of 2·5 minutes, when new and thereafter at intervals of one-and-a-half-years.

NOTE — It may be noted that carbon dioxide type fire extinguisher falls outside the ambit of fluid type extinguisher and shall be tested for its pressure during each refilling and after every five years.

8.7 Care shall be taken during repainting, and during maintenance overhauls, to retain manufacturers original markings.

8.8 All extinguishers shall be kept fully charged at all times.

ANNEX A

(*Clause* 3)

DEFINITIONS RELATING TO VARIOUS TYPES OF FIRST AID FIRE EXTINGUISHERS

A-1 FIRE BUCKET

A-1.1 A bucket containing water or sand and used solely for the purpose of extinguishing fires.

A-2 FLUID TYPES

A-2.1 Fire Extinguisher, Water Type (Soda-Acid)

An extinguisher from which the water is ejected by pressure generated by the release of compressed gas (*see* IS 934 : 1989).

A-2.2 Fire Extinguisher, Water Type (Gas Pressure)

An extinguisher from which the water is ejected by pressure generated by the release gas (*see* IS 940 : 1989).

A-2.3 Fire Extinguishers, Foam Type

An extinguisher from which foam is expelled by CO_2 which is generated due to the chemical reaction of a carbonate and an acid or by mechanically mixing a gas or air to a solution of a foam compound in water (*see* IS 933 : 1989 and IS 10204 : 1982).

A-2.4 Fire Extinguisher, Halon 1211 Type

An extinguisher in which Halon 1211 gas remains under pressure in liquid and gaseous phases. The Halon gas is usually kept super-pressurised with dry/moisture free Nitrogen gas. Halon gas is expelled by the pressure of Nitrogen gas. The Halon 1211 gas is discharged as a jet partly in liquid form and partly as a gas. Halon 1211 is non-conductor of electricity and vaporises rapidly. No messy residue is left out because the extinguishing medium vaporises out (*see* IS 11108 : 1984).

A-2.5 Fire Extinguisher, Carbon Dioxide Type

An extinguisher from which carbon dioxide gas is released under its own pressure (*see* IS 2878 : 1986).

A-3 FIRE EXTINGUISHER, DRY POWDER TYPE

A-3.1 An extinguisher from which powder is ejected by pressure generated by the release of compressed gas such as CO_2 or Nitrogen (*see* IS 2171 : 1985).

NOTE — Fire ratings of these extinguishers will be included later.

ANNEX B

(*Clause* 4.2)

EQUIVALENTS OF FIRE EXTINGUISHERS

B-1 The equivalence of various fire extinguishers is normally determined by the statutory authorities. However, the following is given as a guide:

a) One kilogram of carbon dioxide is equivalent to 2·832 5 litres of fluid type;

b) One kilogram of dry chemical is considered approximately equivalent to one litre of fluid type; and

c) One litre of foam from foam type fire extinguishers may be considered sufficient to tackle oil fires on 690 cm² area.

ANNEX C

(*Clause* 5.1)

CLASSIFICATION OF FIRES, SELECTION OF FIRE APPLIANCE AND GUIDE FOR FIRE FIGHTING

C-1 CLASSIFICATION OF FIRES

C-1.1 For all practical purposes, fires may be classified under the following heads:

a) *Class 'A' Fires* — Fires in ordinary combustible materials, such as wood, paper, textile, hay, wool, rubber, coal, plastics, PVC, etc, where the cooling effect of water is essential for the extinction of fire.

b) *Class 'B' Fires* — Fires in flammable liquids like oils, solvents, petroleum products, varnishes, paints, etc, where a blanketing effect is essential.

c) *Class 'C' Fires* — Fires involving flammable gases under pressure including liquefied gases, where it is necessary to inhibit the burning gas at fast rate with an inert gas, powder or vaporizing liquid for extinguishment.

d) *Class 'D' Fires* — Fires involving combustible metals, such as magnesium, aluminium, zinc, sodium, potassium, where the burning metals are reactive to water and water containing agents, and in certain cases carbon dioxide, halogenated hydrocarbons and ordinary dry powders. These fires require special media and techniques to extinguish.

e) *Class 'E' Fires* — Fires involving electricale quipment where the electrical non-conductivity of the extinguishing media is of prime importance.

C-2 SELECTION OF FIRE APPLIANCES DEPENDING ON THE TYPE OF FIRE

C-2.1 A guide to the selection of right type of first aid fire appliance for different classes of fires is given in Table 1.

Table 1 Selection of First-Aid Appliances

(*Clause* C-2.1)

Type of Extinguisher	Type of Fire for Which Suitable	Type of Fire for Which Non-suitable	Precaution	Capacity of Standard Units
Soda/acid	Wood, paper, textiles, hay wool, rubber, coal, plastics, PVC, rubbish etc	Electrical, hydrocarbons, solvents and used as water-fog or spray	Protect from freezing below 4°C or above 38°C to avoid deterioration	9 litres
Sand	As fire the blanket for covering small surface fires of hydrocarbons, solvents and paint. Also for absorbing oil and paint spills	Electrical or fires in tanks or containers	Keep dry and clean and protect from freezing oil wet	
Water/ carbon dioxide (CO_2)	Wood, paper textiles, rubbish	Electrical, hydrocarbons, metal fire, solvents and paint	Protect against temperatures below 4°C to avoid freezing	9 litres
Carbon dioxide (CO_2)	Electrical, small craft, pumps rooms, machinery spaces and stores rooms	Deep-seated fires of wood, wood, paper, textiles, etc, unless used in conjunction with water. Also metal fires and combustible materials having their own oxygen supply such as cellulose nitrate	Asphyxiating, avoid storage above 60°C	2, 3, 5 6 and 7 kg
Dry chemical*	Electrical, liquefied petroleum gases, hydrocarbons, solvents and paint and oil spillage	Deep seated fires of wood, paper, textiles, etc, unless used in conjunction with water. Also metal fires and combustible materials having their own oxygen supply such as cellulose *nitrate*	Chemical should be of a type which is compatible with foam and kept dry	4·5 kg, 9 kg
Chemical foam*/ Mechanical foam AFFF	Hydrocarbons and paint	Electrical and metal	Protect against temperature below 4°C or above 38°C to avoid deterioration	9 litres
Halon 1211	a) Fires of electrical origin, b) Ship engine	Metal fires and combustible materials having their own oxygen supply such as cellulose area nitrate, etc	a) Avoid inhailing the decomposition gases b) Ventilate after use	1·25 kg

*CO_2 may also be used as the expellent in the maintained pressure type of extinguisher.

ANNEX D

(*Clause* 7.2)

GUIDE FOR SELECTION AND STOWAGE OF PORTABLE FIRE EXTINGUISHERS

D-1 RECOMMENDATIONS

D-1.1 The actual positioning of portable fire extinguishers varies from ship to ship and as per statutory requirements. The following recommendations may be used as guide.

D-1.1.1 When selecting sites for fire appliances, due consideration shall be given to the nature of risk to be covered. Appliances shall be placed in conspicuous positions and shall be readily accessible for immediate use in all parts of the occupancy. It shall always be borne in mind while selecting sites that first-aid fire appliances are intended only for use on incipient fires, and their value may be negligible if the fire is not extinguished or brought under control in the early stages.

D-1.1.2 Generally, portable appliances shall be placed as near as possible to exits or companion way to various spaces on the ships. Wherever possible, advantage shall be taken of normal routes of escape by placing appliances in positions where they shall readily be seen by persons following the natural impulse to get out of danger. It is not advisable to place extinguishers at the ends of deck spaces remote from exits unless they are necessary to cover a particular hazard there.

D-2 ACCOMMODATION SPACES

D-2.1 On each deck and in each separate space at least 2 portable soda-acid fire extinguishers distributed on port and starboard sides are to be placed.

D-3 MACHINERY SPACES

D-3.1 Boiler Room

The number of portable foam fire extinguishers is to be determined by statutory authorities and replacement of these should be undertaken with a view to achieving ready availability at each boiler front near oil fuel units and other spaces where oil spillage is likely to occur. Also, a container having sand (about 300 litres) with a scoop shall be placed near the boiler front.

D-3.2 Engine Room

Where foam portable fire extinguishers are required by the statutory authorities, they may be suitably distributed so as to have at least two portable fire extinguishers at the floor plate level and at least one on each platform above that. Additionally, at least one fire extinguisher should also be placed near each engine room exit.

D-3.3 Pump Room

At least one foam fire extinguisher at the floor plate level and one additional foam fire extinguisher near the pump room entrance shall be provided.

D-3.4 Switchboard and Electrical Space

Near the switch boards and spaces having a concentration of a large number of electrical machinery, there should be at least one Halon 1211 or carbon dioxide fire extinguisher. Where there is no likelihood of damage due to the abrasive properties of dry chemical, these fire extinguishers may also be used.

D-4 RADIO ROOM, BATTERY CHARGING SPACES AND OTHER SPACES CONTAINING ELECTRICAL MACHINERY

D-4.1 When these spaces are adjacent to accommodation spaces, Halon 1211 extinguisher of 1·25 kg capacity may be used. If these spaces are situated away from accommodation spaces, dry chemical and carbon dioxide type of extinguishers may also be used. Use of water discharging extinguishers shall be avoided.

D-5 SERVICE SPACES

D-5.1 Galleys

Normally the type of extinguishers to be used will depend on the type of firing arrangement in the galley. Where there is a likelihood of fires originating from large quantities of burning oil or fat, additional foam extinguisher is recommended. Use of sand in a suitable container (about 30 litres and one scoop) is also recommended.

D-5.2 Lamp, Paint Rooms and Bosun's Stores

At least one foam type of fire extinguishers in each of these spaces is to be provided.

D-6 FIRE CONTROL STATIONS

D-6.1 At least one portable fire extinguisher of each type at each fire control station is recommended, from the point of view of ready availability of fire extinguishers in all parts of the ship.

ANNEX E

(*Clause* 8.1)

ROUTINE MAINTENANCE, INSPECTION AND TESTING OF FIRE EXTINGUISHERS

E-1 GENERAL

Routine maintenance, inspection and testing of all types of portable first aid fire appliances/extinguishers in respect of mechanical parts, extinguishing media and expelling means shall be carried out by properly trained personnel at frequent intervals to make sure that these are in their proper conditions and have not been accidentally discharged or lost pressure or suffered any mechanical damage or due to chemical reaction, etc.

E-2 FIRE EXTINGUISHERS, SODA-ACID TYPE

E-2.1 Routine maintenance, inspection and testing shall be carried out in accordance with the following requirements.

E-2.1.1 *Routine Maintenance*

Routine maintenance shall be carried out as follows as a part of the weekly routine which is normally carried out on board ships for testing emergency equipment.

Clean the exterior of the extinguisher, polish the painted portion with wax polish, the brass parts with metal polish, chromium plated parts with silver polish. Check the nozzle outlet and vent-holes made in the threaded portion of the cap for clogging and check that plunger is in fully extended position and is clean.

E-2.1.2 *Quarterly Inspection*

Once in three months, the extinguishers shall be inspected and necessary adjustments carried out as follows.

E-2.1.2.1 Unscrew the cap and check that the cap washer is soft and intact and that the vent holes are clear of dirt, metal polish or any other foreign matter.

E-2.1.2.2 Check that the plunger is working properly and is neither too loose nor too tight. Remove defects, if any, by changing washer, cleaning vent holes by wire, by tightening or loosening the gland nut on top of the cap through which the plunger passes and by changing the gland packing, as necessary.

E-2.1.2.3 Grease the threads of the cap and plunger rod lightly and wipe clean.

E-2.1.2.4 Withdraw the cage, take out the acid bottle and see if it is intact. Examine the bottle very carefully for hair line cracks. Keep a bucket full of clean water handy while this is being done so that in case the bottle is leaking or breaks, hands could be immediately washed to prevent personal injury.

E-2.1.2.5 Check the washer on the neck of the cage and see that the spring at the bottom of the cage is working properly. Change the washer, if necessary. If the acid bottle is broken or has developed even hairline cracks, recharge the extinguishers with a fresh refill conforming to IS 5490 (Part I) : 1977 after cleaning it thoroughly.

E-2.1.2.6 Stir the solution in the extinguisher with a clean dry stick; top up with clean fresh water (adding anti-freeze, if necessary) if the level has gone down below the solution level mark. Do not pour the solution into any receptacle for stirring.

E-2.1.2.7 Replace the cage with the acid bottle inserted with its teat downwards and resting on the spring serving as cushion. Withdraw the plunger from the cap to its fullest extent and screw down the cap on the extinguisher, making the joint as near gas-tight as possible by using the spanner.

E-2.1.3 *Annual Test*

Half of the total number of extinguishers in use shall be selected for this test every year. The test shall be carried out by actually operating the extinguisher. Advantage shall be taken on this test to give practice in operating them, to the crew members of the ship. In case any of the extinguishers selected for test fails, the remaining half of such extinguishers shall also be tested. Tests shall be so arranged that each extinguisher is discharged once in two years. The test shall be carried out as follows:

a) Operate the extinguisher and check that it projects a jet to a distance of not less than 6 m for at least 60 seconds. Clean the extinguisher thoroughly after test and examine its interior for rust or corrosion.

b) Subject rusty or corroded extinguishers to a pressure test even if they are not due for it and even if their performance is otherwise satisfactory. Recharge the extinguisher from a fresh charge after checking the cap, cage and nozzle as in quarterly inspection, clean and polish externally as laid for routine maintenance.

c) On the completion of the annual inspection, necessary entries shall be made in the fire extinguisher register. The date of last refilling on the extinguisher shall also be changed.

E-2.1.4 *Pressure Test*

The pressure test shall be carried out once in four years by means of a hydraulic pump. Advantage shall be taken of the yearly test for selecting the time for this test. The test shall be carried out as follows.

E-2.1.4.1 Examine the body of the extinguisher visually from the inside for any sign of rust or corrosion. Connect up suitable adapters to the hydraulic test pump after filling the extinguisher completely with water and work the pump. Build up the pressure gradually to 21 kgf/cm^2 and maintain it for five minutes. Watch the extinguisher for any leakage or distortion. Reject the extinguisher if it is found leaking or distorted.

E-2.1.4.2 On completion of the pressure test, necessary entries shall be made in the fire extinguisher register.

E-3 FIRE EXTINGUISHERS, WATER TYPE (GAS CARTRIDGE)

E-3.1 The routine maintenance, inspection and testing shall be carried out in accordance with the following requirements.

E-3.1.1 *Routine Maintenance*

Same as for soda-acid type fire (**E-2.1.1**) except that this extinguisher has spring loaded piercer fitted to its cap in place of a plunger.

E-3.1.2 *Quarterly Inspection*

Once in three months the extinguishers shall be inspected and adjustment carried out as follows.

E-3.1.2.1 Unscrew the cap and check that the cap joint washer is soft and intact and that the vent holes are clear of dirt, metal polish or any other foreign matter. Withdraw the gas cartridge and see that the sealing disc is intact. Check that the piercing mechanism is working properly. Weigh the cartridge and compare the actual weight with the weight stamped on the body of the cartridge. If there is a loss of more than 10 percent of the contents replace the cartridge with a fully charged one.

E-3.1.2.2 Check that the nozzle is not clogged, throw away the water, clean the body of the extinguisher internally; refill the extinguisher up to water level mark with clean fresh water (adding anti-freeze, if necessary). Replace the cartridge which shall conform to IS 4947 : 1985 and screw on the cap tightly.

E-3.1.2.3 On completion of quarterly inspection, necessary entries shall be made in the fire extinguisher register. The date of last refilling on the extinguisher shall also be changed.

E-3.1.3 *Pressure Test*

These extinguishers shall be subjected to pressure test once every four years in the same manner as for soda-acid type fire extinguishers (*see* **E-2.1.4**).

E-4 FIRE EXTINGUISHER, FOAM TYPE

E-4.1 Routine maintenance, inspection and testing shall be carried out in accordance with the following requirements.

E-4.1.1 *Routine Maintenance*

Same as for soda-acid type fire extinguisher (*see* **E-2.1.1**).

E-4.1.2 *Quarterly Inspection*

Once in three months the extinguishers shall be inspected and necessary adjustment carried out as follows.

E-4.1.2.1 Unscrew cap and check that the cap washer is soft intact and the vent holes in the threaded portion of the cap and the plunger disc are clear. Also, check the plunger rod for proper working so that it is neither too loose nor too tight. Adjust tightness, if any, in the same way as in case of soda-acid type for fire extinguishers (*see* **E-2.1.2**).

E-4.1.2.2 On completion of the inspection, necessary entries shall be made in the fire extinguisher register. The date of last inspection on the extinguisher shall also be changed.

E-4.1.3 *Annual Test*

Half of the total number of extinguishers in use shall be selected for this test every year. The test shall be carried out by actually operating the extinguisher. Advantage shall be taken of this test, to give practice, in operating them, to the crew members of the ship. In case of any of the extinguishers selected for test fails, the remaining half of such extinguisher shall also be tested. Tests shall be so arranged that each extinguisher is discharged once in two years. The test shall be carried out as follows.

E-4.1.3.1 Operate the extinguisher and check that it projects a jet to a distance of not less than 6 m for a minimum period of 60 seconds. Clean the extinguisher thoroughly after the test and examine its interior for rust and/or corrosion.

E-4.1.3.2 Subject rusty or corroded extinguishers to a pressure test even if they are not due for it and even if their performance is otherwise satisfactory. Recharge the extinguisher from a fresh charge immediately.

E-4.1.3.3 On completion of the annual inspection, necessary entries shall be made in the fire extinguisher register. The date of last refilling on the extinguisher shall also be changed.

E-4.1.4 *Pressure Test*

The pressure test shall be carried out once in four years in the manner described for the soda-acid type (*see* **E-2.1.4**).

E-5 FIRE EXTINGUISHERS, HALON 1211 STORED PRESSURE, SQUEEZE GRIP (UPRIGHT OPERATION TYPE)

E-5.1 The routine maintenance, inspection and testing shall be carried out in accordance with the following requirements.

E-5.1.1 *Routine Maintenance*

Shall be carried out as follows:

i) Check the pressure on the pressure gauge. If the pointer shifts to "Recharge range" the extinguisher, is discharged. It shall be sent for recharging.

ii) Clean the exterior of the extinguisher, polish the painted portion with wax polish, the brass parts with metal polish, chromium plated parts with silver polish. Check the nozzle outlet.

iii) The safety pin/locking pin must always be put in its proper position to avoid any accidental discharge due to unintentional pressing of operation lever.

iv) Do not tamper with the valve body and safety rupture disc.

v) Whether the extinguisher is in charged condition may be ascertained by weighing also.

NOTE — If the extinguisher is only partially discharged, it may be used to give fire practice drill, of operating the extinguisher on fire, outside the ship but in a confined enclosure.

E-6 FIRE EXTINGUISHERS, CARBON DIOXIDE TYPE

E-6.1 The routine maintenance, inspection and testing shall be carried out in accordance with the following requirements.

E-6.1.1 *Annual Test*

The test shall be carried out once every year as follows.

E-6.1.1.1 Weigh the extinguisher. Compare the weight with the weight of the fully charged extinguisher which is marked on the body. If there is a loss of more than 10 percent of the contents, use the extinguisher for fire practice drill and send the extinguisher for recharging. Clean and polish externally.

Examine the high pressure rubber hose, horn and valve assembly. If the hose has developed cracks it shall be got replaced.

E-6.1.1.2 On completion of the inspection, necessary entries shall be made in the extinguisher register. The date of last inspection or refilling on the extinguisher shall also be changed as the case may be.

E-6.1.2 *Pressure Test*

Every time the extinguisher is sent for recharging, the organization doing the recharging shall be asked to certify that the cylinder has been tested to 210 kgf/cm^2, pressure before recharging.

E-6.1.3 The bursting discs fitted shall be guaranteed to burst at pressures between 182 kgf/cm^2 and 200 kgf/cm^2 and that the filling ratio for carbon dioxide gas shall not be higher than two thirds of water capacity.

E-7 FIRE EXTINGUISHERS, DRY CHEMICAL POWDER (GAS CARTRIDGE TYPE)

E-7.1 The routine maintenance, inspection and testing shall be carried out in accordance with the following requirements.

E-7.1.1 *Quarterly Inspection*

Once in three months, the extinguishers shall be inspected and adjustment carried out as follows.

E-7.1.1.1 First press the squeeze grip nozzle, if no powder comes out then remove the cap by unscrewing. Check that the cap joint washer is soft. If it has aged or developed cracks, replace it with a new washer. Withdraw gas cartridge and see that the sealing disc is intact. Weigh the cartridge and compare the weight with the weight stamped on its body. If there is a loss of more than 10 percent of the contents replace it with a fully charged one.

E-7.1.1.2 Check the piercing mechanism in the cap (while the cartridge has been removed) for proper functioning and also check that the washer in the cap is soft and intact.

E-7.1.1.3 Check, clean and lightly grease the threads in the cap and the cartridge holder and wipe clean. Check the port holes in the cartridge holder and clean, if necessary.

E-7.1.1.4 Remove the inner shell and clean port holes; if necessary.

E-7.1.1.5 Pour out the powder in a clean, dry receptacle in a dry area and check to ensure that no granulation or caking has occurred. Change powder if granulation or caking has occurred. Replace inner shell, fit cartridge to the cartridge holder screw on the cap tightly. Replace safety clip on cap. The dry powder charge shall conform to IS 4308 : 1982 and CO_2 gas cartridge shall conform to IS 4947 : 1985.

E-7.1.1.6 Check the trigger nozzle for clogging and clean if necessary.

E-7.1.1.7 Check rubber hose for cracks and apply french chalk to it.

E-7.1.1.8 Clean the exterior of the extinguisher, polish the painted portion with wax polish, the brass parts with metal polish; chromium plated parts with silver polish. The extinguisher body must not be washed with water.

E-7.1.1.9 On completion of the inspection, necessary entries shall be made in the extinguisher register and the date of last inspection on the extinguisher changed.

E-7.1.2 *Annual Test*

One-fourth of the total number of extinguishers of this type on charge shall be selected for this test every year. The test shall be carried out by actually operating the extinguisher and watching for satisfactory performance specified below:

Capacity of Extinguisher kgf	*Minimum Duration of Effective Discharge* seconds	*Maximum Period for 90 Percent Discharge of the Charge* seconds	*Range of Throw of Jet* m
2	10	15	3·0 to 4·5
5	15	15	3·5 to 5·5
10	23	30	5·0 to 7·5

E-7.1.2.1 Advantage shall be taken of this test to give practice, in operating them to the crew members of the ship. In case of failure of any extinguishers, the remaining three-fourth of such extinguishers shall also be tested. Tests shall be so arranged that each extinguisher is discharged once in five years. After the test, the extinguishers shall be cleaned with a dry cloth and recharged immediately.

E-7.1.2.2 The extinguishers shall be polished externally.

E-7.1.2.3 On completion of test, necessary entries shall be made in the fire extinguishers register and the date of last inspection on the extinguisher changed.

E-7.1.3 *Pressure Test*

This test shall be carried out once in four years in the manner described in **E-2.1.4** except that these extinguishers are to be tested at a pressure of 31·5 kgf/cm^2. Before recharging, the extinguishers shall be bone dry. After the test, the extinguishers shall be cleaned and polished externally.

E-7.1.3.1 On completion of the test, necessary entries shall be made in the fire extinguisher register and the date of last pressure test changed on the extinguisher.

ANNEX F

(*Foreword*)

COMMITTEE COMPOSITION

Marine Instruments and Safety Aids Sectional Committee, TED 20

Chairman	*Representing*
Capt S. S. Naphade	DG Shipping, Bombay
Members	
Shri A. K. Prashad (*Alternate* to Capt S. S. Naphade)	
Capt S. B. Aga	Ericson & Richards, Bombay
Shri D. R. Bapat Shri K. R. Easwaran (*Alternate*)	Mather & Platt (India) Ltd, Bombay
Capt N. N. Bhansali	The Company of Master Mariners of India, Bombay
Shri S. Chakraborty Shri R. Ray Chowdhary (*Alternate*)	Calcutta Port Trust, Calcutta
Dr Ashok Chandra Shri V. V. Singh (*Alternate*)	Ministry of Communication, New Delhi
Shri A. K. Chopra	Indian Register of Shipping, Bombay
Deputy Director Lt Cdr A. Anand (*Alternate*)	Ministry of Defence (NHQ), New Delhi
Capt T. D. Hazari Capt A. K. Ghatak (*Alternate*)	The Shipping Corporation of India Ltd, Bombay
Shri K. T. Kochupaul Shri V. Chandra Bose (*Alternate*)	Cochin Shipyard Ltd, Cochin
Shri V. M. Kulkarni Shri G. I. Mukadam (*Alternate*)	Mazagon Dock Limited, Bombay
Shri C. N. Mistry	Shaparia Dock & Steel Co Private Ltd, Bombay
Shri P. Mitra Shri K. J. Ray (*Alternate*)	Alcock Ashdown & Co Ltd, Bhavanagar
Capt N. H. Sadarrangani Capt A. K. Ranade (*Alternate*)	Indian National Shipowners Association, Bombay
Shri Jatindera R. Salot Shri Harish R. Salot (*Alternate*)	Vijay Fire Protection Systems Pvt Ltd, Bombay
Shri A. Sheshagiri Rao Shri P. Krishna Rao (*Alternate*)	Hindustan Shipyard Ltd, Visakhapatnam
Cdr A. C. Sud Shri V. S. Vasisht (*Alternate*)	Ministry of Defence, DQA (N), New Delhi
Cdr A. P. V. Thampan Asstt Dir of Systems [W] (*Alternate*)	Ministry of Defence, Directorate of Systems, New Delhi
Shri N. S. Vijayaraghavan, Director (Transport Engineering)	Director General, BIS (*Ex-officio Member*)

Member Secretary
Shri N. S. Judge
Director (Transport Engineering), BIS

Composition of Fire Detection and Extinguishing Equipment Subcommittee, TED 20 : 1

Convener	*Representing*
Shri E. J. D'Sa	Nippon Kaiji Kyoji, Bombay
Members	
Shri A. S. Aga	Ericson and Richards, Bombay
Shri P. K. Chatterji Shri H. S. Kaprawan (*Alternate*)	Ministry of Defence (R & D), Delhi
Deputy Chief Surveyor	D. G. Shipping, Bombay
Shri K. R. Eswaran Shri D. R. Bapat (*Alternate*)	Mather & Platt (Iadia) Ltd, Bombay
Shri A. Ashok Kumar Shri K. Siva Reddy (*Alternate*)	Electronics Corporation of India Ltd, Hyderabad
Shri S. Kumar	Indian Register of Shipping, Bombay
Shri S. Mitra	Garden Reach Shipbuilders & Engineers Ltd, Calcutta
Capt H. K. D. Patel	Indian National Shipowners Association, Bombay
Shri P. Rajkumar Shri Jitendra R. Salot (*Alternate*)	Vijai Machinery Stores, Bombay
Shri P. H. Sethna Shri N. T. Panjwani (*Alternate*)	Kooverji Devshi & Co Pvt Ltd, Bombay
Lt Cdr S. K. Sharma	Ministry of Defence (NHQ), New Delhi
Shri T. P. Sharma Shri R. S. Chimote (*Alternate*)	Central Building Research Institute, Roorkee
Shri D. K. Vaidhya Shri V. P. Jirape (*Alternate*)	Mazagon Dock Ltd, Bombay

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmoious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Revision of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards Monthly Addition'.

This Indian Standard has been developed from Doc : No. TED 20 (921).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:
Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	331 01 31 331 13 75
Eastern : 1/14 C. I. T. Scheme VIII M, V. I. P. Road, Maniktola CALCUTTA 700054	37 84 99, 37 85 61 37 86 26, 37 86 62
Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036	53 38 43, 53 16 40 53 23 84
Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113	235 02 16, 235 04 42 235 15 19, 235 23 15
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) BOMBAY 400093	632 92 95, 632 78 58 632 78 91, 632 78 92

Branch : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD, GUWAHATI. HYDERABAD. JAIPUR. KANPUR LUCKNOW. PATNA. THIRUVANANTHPURAM.

Printed at Printwell Printers, Aligarh, India